JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- October 2018

Dr. Vivek Sehgal

M.Tech. I Semester

COURSE CODE: 10M11CI114   MAX. MARKS: 25

COURSE NAME: HIGH PERFORMANCE COMPUTER ARCHITECTURE

COURSE CREDITS: 03   MAX. TIME 1.5Hr

Note: All questions are compulsory. Each question carries equal marks. Carrying of mobile phone during examinations will be treated as case of unfair means.

1. Define the following terms related to parallelism and dependence relations:

   i. Computational granularity.
   ii. Communication latency.
   iii. Flow dependence.
   iv. Anti dependence.
   v. Output dependence.
   vi. I/O dependence.
   vii. Control dependence.
   viii. Resource dependence.
   ix. Bernstein conditions.
   x. Degree of parallelism.

2. The following five statements labeled P_1, P_2, P_3, P_4, and P_5, in program order

$$P_1: C = D \times E$$
$$P_2: M = G + C$$
$$P_3: A = B + C$$
$$P_4: C = L + M$$
$$P_5: F = G + E$$

(a) Draw dependence graph showing both data dependence (solid arrows) and resource dependence (Dashed arrows)

(b) Draw the Sequential execution in five steps, assuming one step per statement

(c) Draw the Parallel execution in three steps, assuming two adders are available per step

3. (a) Explain the Mismatch between software parallelism and hardware parallelism for eight instructions (four load and four arithmetic instructions)

   (b) What is the role of control parallelism and data parallelism in parallel programming?

4. Convert the following Fine-grain program graph before packing in to Coarse-grain program graph after packaging

Legends:
(n,s) = (node, grain size)
(x,i) = (input, delay)
(u,k) = (output, delay)
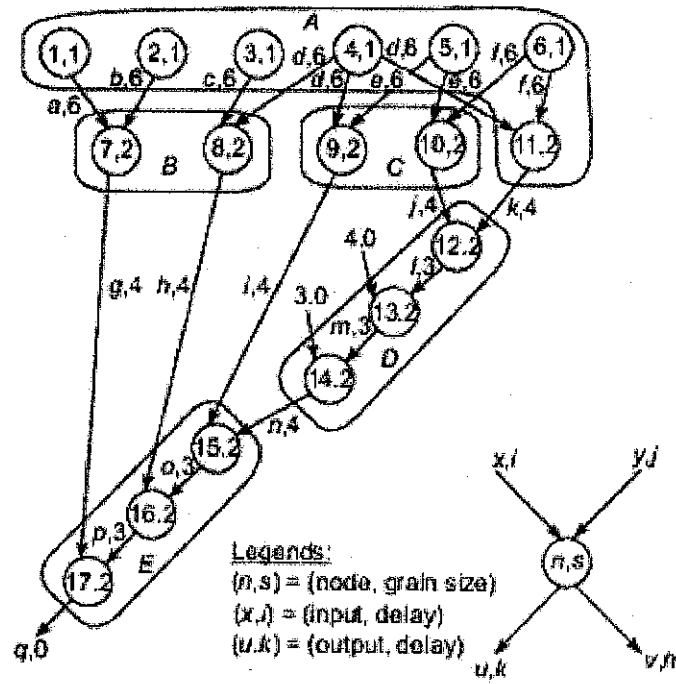
Also, Plot the Scheduling of the fins-grain and coarse-grain programs

5. What is the use of node duplication in Static Multiprocessor Scheduling? Convert the following schedule with node duplication.